Amendments to the Specification

On page 12, third full paragraph

Accordingly, by adjusting the size, shape and distribution of the overlay information from the two layers or patterns within the field of view of the overlay metrology tool, it is possible to diminish the impact of lithography and/or process non-uniformities, asymmetries and variations. In some cases, it may even be possible to enhance the overlay measurement.[[.]] Resist patterns are less inclined to process variation and thus they may potentially be more useful for acquisition areas of the mark.

On pages 16 and 17, last and first paragraphs, respectively

For specific processes, such as aluminum coated, chemically mechanically polished tungsten, it is advantageous for the characteristic dimensions of these structures to be approximately_1_to 2 microns or less in order to diminish the impact of asymmetries resultant from the polishing and aluminum deposition processes. However, if the width of the trench is too small, the remaining topography at the top of the aluminum layer is too small to provide optically adequate contrast and thus the mark does not provide adequate overlay information. On the other hand, the lower bound for characteristic dimensions of structures at this scale is determined by the resolution limit of the metrology tool. For example for an overlay tool with a numerical aperture (NA) of 0.9 and a mean illumination wavelength of 550 nm gives a Raleigh resolution limit or criteria of approximately 0.4 microns. In this particular case, it may be preferable to maintain the linewidth above 0.5 microns in order not to diminish contrast and hence signal to noise, and below 1-2 micron in order to diminish the impact of asymmetries resultant from the polishing and aluminum deposition processes. It should be noted[[]], however, that this is by way of example and not by way of limitation and that it may be possible to achieve better that the Rayleigh resolution limit.

On page 18, 19, last and first paragraph, respectively

In the embodiment shown, the lines of the periodic structures 74A-D are parallel to one another so as to provide position information in a single direction. As should be appreciated, the lines in Fig. [[1]] 2 are configured for X-axis measurements since the lines are non-parallel (e.g., perpendicular or orthogonal) to the axis of measurement. Given this configuration, any offset between the two successive layers in the X-direction will be present between the first set of periodic structures 74 A&D and the second set of periodic structures 74 B&C. As such, the

alignment between the two layers of the wafer in the X-direction may be determined by comparing the relative positions of the two groups of periodic structures. For instance, the positions of periodic structures 74 A and D, which are disposed on the first layer, may be compared with the positions (e.g., centers of symmetry) of periodic structures 74 B and C, which are disposed on the second layer, to determine the alignment between consecutive layers in the X direction.

On page 21, first full paragraph

In one embodiment, the feature size and pitch (e.g., the distance between the centers of the finely segmented elements of the finely segmented elements are substantially equal to those of the critical device features of the patterning step performed on the layers under test. That is, the dimensions of the finely segmented elements 78 are comparable to the dimensions of the circuit patterns. In one implementation, the line has a width that is approximately equal to the width of an integrated circuit interconnection line. Currently, circuit interconnection lines have widths that are approximately equal to or less than 0.13 **[[u]]**μm. The finely segmented elements of the current invention can be made to have widths as small as 0.05 - 0.2 **[[u]]**μm. However, as can be appreciated, advances in semiconductor manufacturing processes are likely to further reduce these dimensions and therefore these dimensions are by way of example and not by way of limitation.

On page 22, second full paragraph

In both situations, the resulting asymmetries to overlay marks due to the fabrication processes may be reduced by forming smaller marks. With respect to the sputtering process, smaller recessed channels or ridges allows less sputtered material to accumulate on the respective side surfaces, thereby resulting in a smaller asymmetrical shift in shape and size. With respect to the CMP process, marks having smaller dimensions will also be shifted to a lesser degree. Conversely, there may be process situations, where widening the lines of the overlay marks may make them more robust to process variation, as for example, in cases of metal layers with large grain size. Refer to **Lithography Process Control**, by Harry J. Levinson, for further information on wafer fabrication asymmetries.

On page 31, first full paragraph

As should be appreciated, each of the groups 134 and 136 represents an "X" – configured mark (albeit offset). For example, working group 134 includes working zones 132A&D, which are on the same first layer and in diagonally opposed positions relative to one another, and working zones 132B&C, which are on the same second layer and in diagonally opposed positions relative to one another. Further, working zones 132A&D are angled relative to working zones 132[[2]]B&C. Further still, working zone 132A is spatially offset from working zone 132D, and working zone 132B is spatially offset from working zone 132D.

On page 31, second full paragraph

In addition, working group 136 includes working zones 132E&H, which are on the same first layer and in diagonally opposed positions relative to one another, and working zones 132F&G, which are on the same second layer and in diagonally opposed positions relative to one another. Further, working zones 132E&H are angled relative to working zones 132[[2]]F&G. Further still, working zone 132E is spatially offset from working zone 132H, and working zone 132F is spatially offset from working zone 132G. In essence, this particular mark produces two "X" configured marks that are positioned orthogonal to each other, i.e., working group ~~194~~ **134** and working group ~~196~~ **136**.

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To elaborate further, a working zone on one layer is generally juxtaposed relative to a working zone on another layer. For example, in the first working group, working zone 132A is juxtaposed relative to working zone 132B and working zone 132C is juxtaposed relative to working zone 132D. Similarly, in the second working group, working zone 132E is juxtaposed relative to working zone 132[[H]]**F** and working zone 132[[F]]**G** is juxtaposed relative to working zone 132[[G]]**H**. Of the two juxtaposed pairs, the working zone on the second layer is typically positioned closer to the center of the FOV than the working zone on the first layer. For example, working zones 132B and C and working zones 132 F and G are positioned closer to the center 142 of the FOV 144 than their juxtaposed working zones 132A and D and working zones 132 E and H, respectively. Furthermore, within each of the working groups, the juxtaposed pairs are positioned in an opposed relationship (e.g., diagonal) relative to the other.

On page 34, first full paragraph

The overlay mark 190 includes a plurality of working zones 192 for determining the registration error between two wafer layers in two different directions. In the illustrated embodiment, the overlay mark 140 includes eight triangularly shaped working zones 192, which are configured to substantially fill its perimeter[[ ]]. The working zones 192 represent the actual areas of the mark that are used to calculate alignment between different layers of the wafer. As mentioned previously, the working zones 192 are spatially separated from one another so that they do not overlap portions of an adjacent working zone. In this particular configuration, all of the working zones 192 are separated via exclusion zones 193.

On page 35, second full paragraph

In addition, working group ~~136~~ **196** includes working zones 192E&H, which are on the same first layer and in opposed positions relative to one another, and working zones 192F&G, which are on the same second layer and in opposed positions relative to one another. Further, working zones 192E&H are angled relative to working zones 192F&G. Further still, working zone 192E is spatially offset from working zone 192H, and working zone 192F is spatially offset from working zone 192G. In essence, this particular mark produces two "X" configured marks that are positioned orthogonal to each other, i.e., working group 194 and working group 196.

On page 35, third full paragraph

To elaborate further, a working zone on one layer is generally juxtaposed relative to a working zone on another layer. For example, in the first working group, working zone 192A is juxtaposed relative to working zone 192B and working zone 192C is juxtaposed relative to working zone 192D. Similarly, in the second working group, working zone 192E is juxtaposed relative to working zone 192[[H]]**F** and working zone 192[[F]]**G** is juxtaposed relative to working zone 192[[G]]**H**. For this mark configuration and in the case of zero overlay (as shown), all of the working zones 192 are equally positioned relative to the center of the mark. Furthermore, within each of the working groups, the juxtaposed pairs are positioned in an opposed relationship (e.g., upper/lower and right/left) relative to the other juxtaposed pair in the group. For example, juxtaposed pairs 192A&B are positioned opposite juxtaposed pairs 192C&D, and juxtaposed pairs 192E&F are positioned opposite juxtaposed pairs 192G&H.

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For ease of discussion, the periodic structures 198 may be broken up into a first periodic structure 198A that is associated with the first working group 194 and a second periodic structure 198B that is associated with the second working group 196. As shown, the first periodic structures 198A are all oriented in the same direction, i.e., the coarsely segmented lines ~~190A~~ are parallel and horizontally positioned relative to each other. The second periodic structures 198B are also all oriented in the same direction (albeit differently than the first periodic structures), i.e., the coarsely segmented lines 198B are parallel and vertically positioned relative to each other. As such, the periodic structures 198A in the first working group 194 are orthogonal to the periodic structures 198B in the second working group 196. Furthermore, in order to accommodate each zone within the FOV, the coarsely segmented lines 190 decrease in length as they move from the outer regions of the mark to the inner regions of the mark. Although not shown, the coarsely segmented line may be formed by a plurality of finely segmented elements to further enhance this mark.